

## **CLAIMS**

- 1      1. A microphotonic device comprising:
  - 2            a membrane structure that can experience strain; and
  - 3            a waveguide element formed on said membrane structure so that when said
  - 4            membrane structure is strained, said waveguide element is tuned to a selective amount.
- 1      2. The microphotonic device of claim 1, wherein said membrane structure comprises a  
2        sub-micron SiO<sub>2</sub> layer.
- 1      3. The microphotonic device of claim 1, wherein said waveguide element comprises a  
2        microring resonator.
- 1      4. The microphotonic device of claim 1, wherein said waveguide element comprises a  
2        microracetrack resonator.
- 1      5. The microphotonic device of claim 1, wherein said waveguide element comprises a 1-  
2        dimensional photonic crystal.
- 1      6. The microphotonic device of claim 1, wherein said waveguide element comprises a 2-  
2        dimensional photonic crystal.
- 1      7. The microphotonic device of claim 5, wherein said 1-dimensional photonic crystal  
2        comprises holes.
- 1      8. The microphotonic device of claim 7, wherein said selective amount comprises  
2        approximately 1%.
- 1      9. The microphotonic device of claim 3, wherein said selective amount comprises 0.2%.

1       10. The microphotonic device of claim 1 further comprising at least one piezoelectric  
2       actuator that is coupled to said membrane so as to produce said strain.

1       11. A method of forming a microphotonic device comprising:  
2              providing a membrane structure that can experience strain; and  
3              forming a waveguide element on said membrane structure so that when said  
4       membrane structure is strained said waveguide element is tuned to a selective amount.

1       12. The method of claim 11, wherein said membrane structure comprises a sub-micron  
2       SiO<sub>2</sub> layer.

1       13. The method of claim 11, wherein said waveguide element comprises a microring  
2       resonator.

1       14. The method of claim 11, wherein said waveguide element comprises a  
2       microracetrack resonator.

1       15. The method of claim 11, wherein said waveguide element comprises a 1-dimensional  
2       photonic crystal.

1       16. The method of claim 11, wherein said waveguide element comprises a 2-dimensional  
2       photonic crystal.

1       17. The method of claim 15, wherein said 1-dimensional photonic crystal comprises  
2       holes.

1       18. The method of claim 17, wherein said selective amount comprises approximately  
2       1%.

- 1      19. The method of claim 13, wherein said selective amount comprises 0.2%.
- 1      20. The method of claim 11 further comprising providing at least one piezoelectric
- 2      actuator that is coupled to said membrane so as to produce said strain.